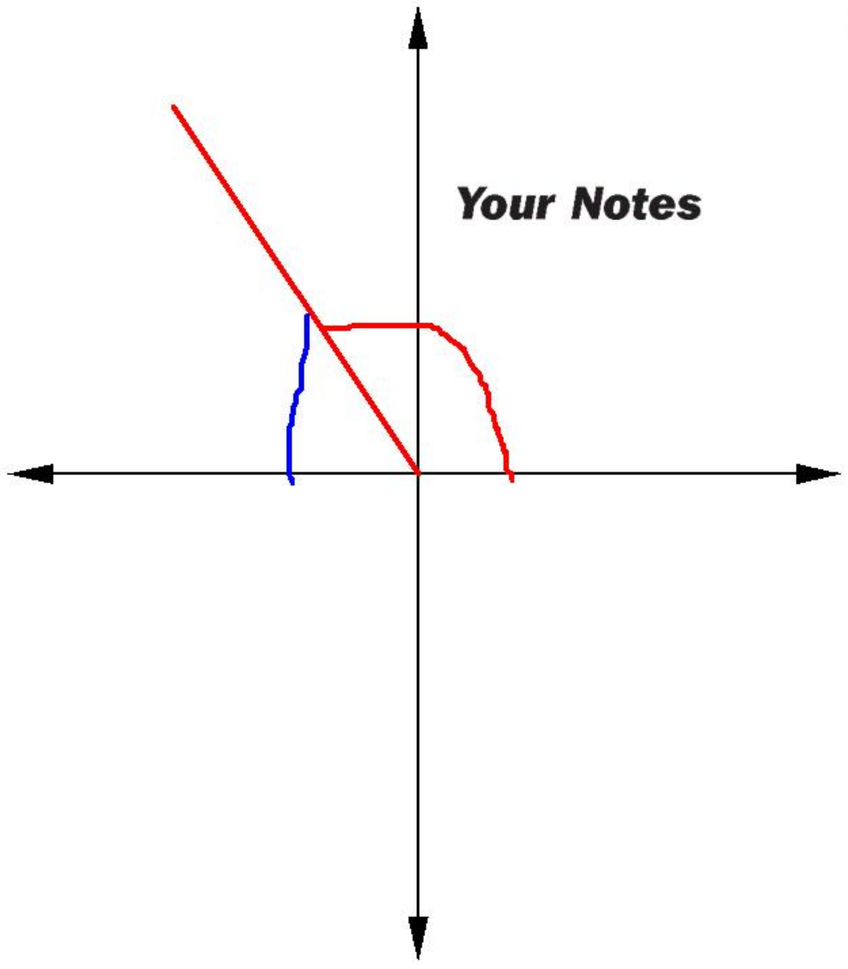
13.2 Define General Angles and Use Radian Measure

Goal • Use general angles that may be measured in radians.



Your Notes

VOCABULARY

Initial side and terminal side

Standard position

Coterminal

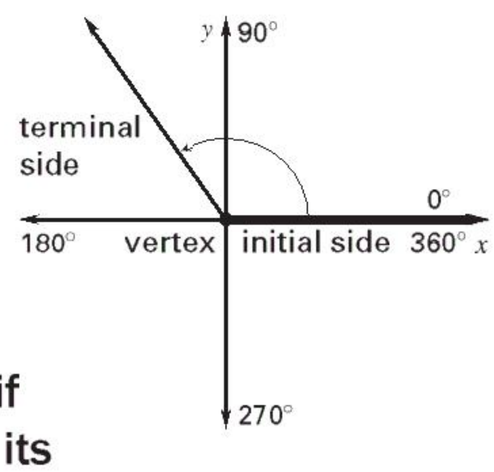
Radian

Sector

Central angle

ANGLES IN STANDARD POSITION

In a coordinate plane, an angle can be formed by fixing one ray, called the _____ side, and rotating the other ray, called the _____ side, about the _____.



An angle is in standard position if its vertex is at _____ and its initial side lies on the positive _____.

Your Notes

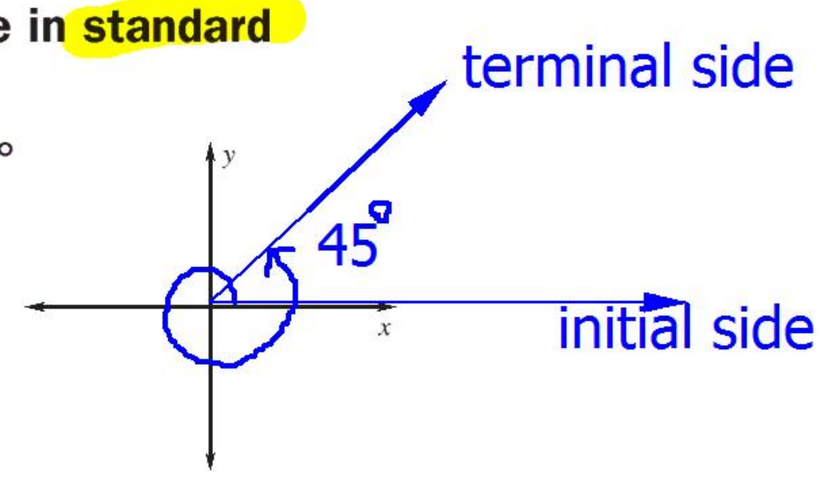
Example 1 ***Draw angles in standard position***

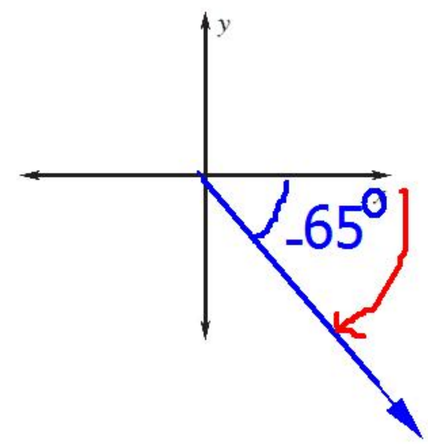
Draw an angle with the given measure in standard position.

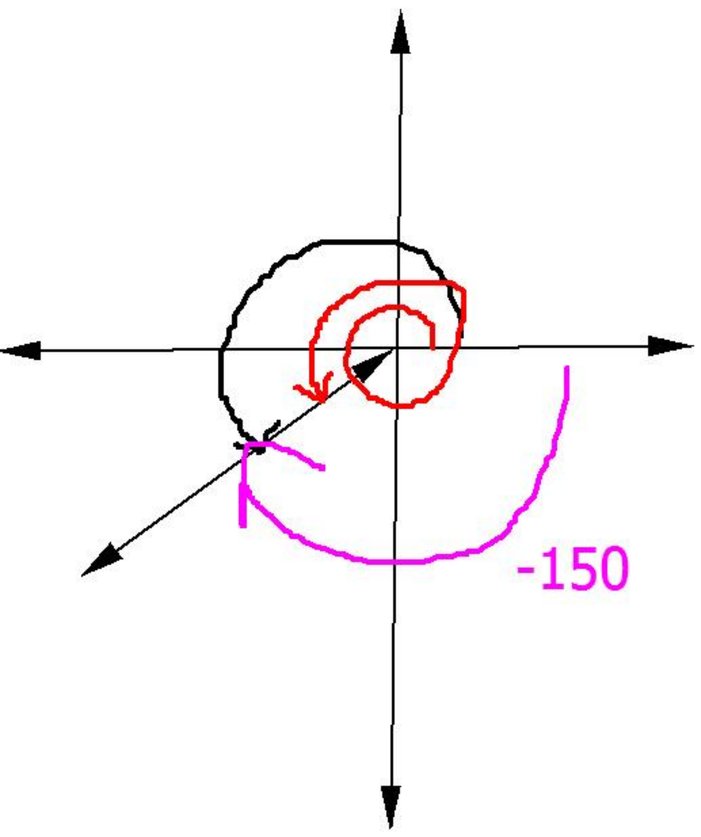
a. 405° **b.** −65°

a. Because 405° is 45° more than 360°, the terminal side makes one whole revolution 360 degree plus 45° more.

b. Because −65° is negative, the terminal side is 65 degree from the positive *x*-axis.







Example 2 ***Find coterminal angles***

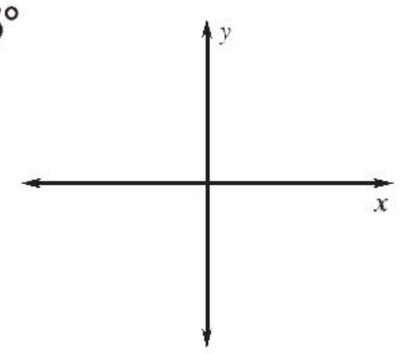
Find one positive angle and one negative angle that are coterminal with 210°.

There are many such angles, depending on what multiple of 360° is added or subtracted.

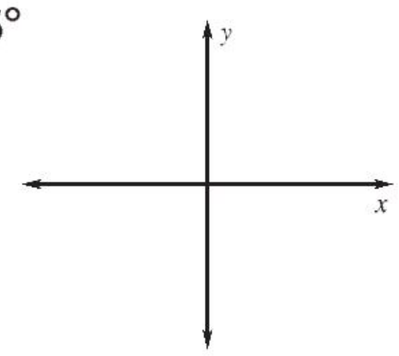
210° + 360° = 570 210° − 360° = -150

Checkpoint **Draw an angle with the given measure in standard position. Then find one positive coterminal angle and one negative coterminal angle.**

1. 485°



2. −75°



Your Notes

CONVERTING BETWEEN DEGREES AND RADIANS

Degrees to radians

Multiply degree measure by $\frac{\pi \text{ radians}}{180°}$.

Radians to Degrees

Multiply radian measure by $\frac{180°}{\pi \text{ radians}}$.

Example 3 ***Convert between degrees and radians***

Convert (a) 315° to radians and (b) $\frac{\pi}{6}$ radians to degrees.

a. $315° = 315°\left(\quad\right) =$ _____

b. $\frac{\pi}{6} = \left(\frac{\pi}{6} \text{ radians}\right)\left(\quad\right) =$ _____

✔ ***Checkpoint*** **Convert the degree measure to radians or the radian measure to degrees.**

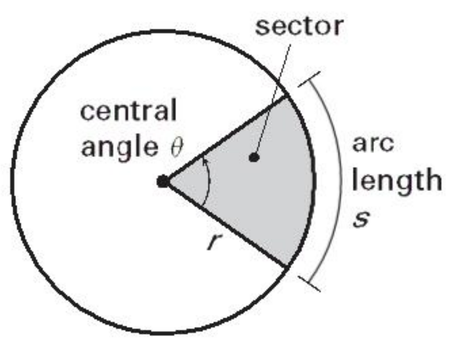
3. 200°	**4.** $\frac{\pi}{5}$

ARC LENGTH AND AREA OF A SECTOR

The arc length s and area A of a sector with radius r and central angle θ (measured in radians) are as follows.

Arc length: $s = r\theta$

Area: $A = \frac{1}{2}r^2\theta$



Your Notes

Example 4 ***Solve a multi-step problem***

Find the arc length and area of a sector with a radius of 15 inches and a central angle of 60°.

Solution

1. Convert the measure of the central angle to radians.

$60° = 60°\left(\quad\right) = \quad$ radians

2. Find the arc length and the area of the sector.

Arc length: $s = r\theta$

$= \quad\left(\quad\right)$

$=$

$\approx$ inches

Area: $A = \frac{1}{2}r^2\theta$

$= \frac{1}{2}(\quad)^2\left(\quad\right)$

$=$

$\approx$ square inches.

✔ ***Checkpoint*** **Find the arc length and area of the sector with given radius and angle.**

5. $r = 5$ ft, $\theta = 75°$

Homework